Amendment to Claims

This listing of Claims will replace all prior versions and listings of claims in this Application.

Listing of Claims

Claim 1. (CURRENTLY AMENDED) A method of forming a SiGe layer having a relatively high Ge content, comprising:

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preparing a silicon substrate;

depositing a layer of SiGe to a thickness of between about 100 nm to 500 nm, wherein the Ge content of the SiGe layer is equal to or greater than 10%;

implanting H_2^+ ions through the SiGe layer into the substrate at a dose of between about $2x10^{14}$ cm^{-2} to $2x10^{16}$ cm^{-2}, at an energy of between about 20 keV to 100+ keV;

low temperature thermal annealing at a temperature of between about 200°C to 400°C for between about ten minutes and ten hours;

high temperature thermal annealing the substrate and SiGe layer, to relax the SiGe layer, in an inert atmosphere at a temperature of between about 650°C to 1000°C for between about 30 seconds and 30 minutes to form a relaxed SiGe buffer layer; and

depositing a layer of tensile-strained silicon on the relaxed SiGe buffer layer to a thickness of between about 5 nm to 30 nm.

Claim 2. (ORIGINAL) The method of claim 1 wherein said depositing a layer of SiGe includes depositing the layer of SiGe at a temperature of between about 400°C to 600°C.

Claim 3. (ORIGINAL) The method of claim 1 which further includes, prior to said implanting, depositing a layer of silicon oxide on the SiGe layer to a thickness of between about 50Å to 300Å.

Claim 4. (ORIGINAL) The method of claim 1 which further includes, after said high temperature thermal annealing, depositing a layer of relaxed SiGe having a thickness of at least 100nm on the relaxed SiGe layer.

Claim 5. (ORIGINAL) The method of claim 1 wherein said low temperature thermal annealing is done in an inert atmosphere taken from the group of inert atmospheres consisting of argon and nitrogen.

Claim 6. (CURRENTLY AMENDED) A method of forming a SiGe layer having a relatively high Ge content, comprising:

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preparing a silicon substrate, wherein the silicon substrate is taken from the group of substrates consisting of bulk silicon and SIMOX;

depositing a layer of SiGe to a thickness of between about 100 nm to 500 nm, wherein the Ge content of the SiGe layer is equal to or greater than 10%, by number of atoms, and where said depositing is done at a temperature in a range of between about 400°C and 600°C;

implanting H_2^+ ions through the SiGe layer into the substrate at a dose of between

about $2x10^{14}$ cm^{-2} to $2x10^{16}$ cm^{-2}, at an energy of between about 20 keV to 100+ keV;

low temperature thermal annealing at a temperature of between about 200°C to 400°C for between about ten minutes and ten hours in an inert atmosphere taken from the group of inert atmospheres consisting of argon and nitrogen;

thermal annealing the substrate and SiGe layer, to relax the SiGe layer, in an inert atmosphere at a temperature of between about 650°C to 1000°C for between about 30 seconds and 30 minutes <u>to form a relaxed SiGe buffer layer</u>; and

depositing a layer of material taken from the group of materials consisting of tensile-strained silicon, tensile strained SiGe, compressed SiGe, and a composite stack thereof, on the relaxed SiGe <u>buffer</u> layer to a thickness of between about 5 nm to 30 nm.

Claim 7. (ORIGINAL) The method of claim 6 which further includes, prior to said implanting, depositing a layer of silicon oxide on the SiGe layer to a thickness of between about 50Å to 300Å.

Claim 8. (ORIGINAL) The method of claim 6 which further includes, after said high temperature thermal annealing, depositing a layer of relaxed SiGe having a thickness of about 100nm on the relaxed SiGe layer.

Claim 9. (CURRENTLY AMENDED) A method of forming a SiGe layer having a relatively high Ge content, comprising:

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preparing a silicon substrate;

depositing a layer of SiGe to a thickness of between about 100 nm to 500 nm, wherein the Ge content of the SiGe layer is equal to or greater than 10%, by number of atoms, and at a temperature in a range of between about 400°C to 600°C;

implanting H_2^+ ions through the SiGe layer into the substrate at a dose of between about $2x10^{14}$ cm^{-2} to $2x10^{16}$ cm^{-2}, at an energy of between about 20 keV to 100+ keV;

low temperature thermal annealing at a temperature of between about 200°C to 400°C for between about ten minutes and ten hours;

thermal annealing the substrate and SiGe layer, to highly relax the SiGe layer in an inert atmosphere at a temperature of between about 650°C to 1000°C for between about 30 seconds and 30 minutes to form a relaxed SiGe buffer layer; and

depositing a layer of silicon-based material on the relaxed SiGe buffer layer to a thickness of between about 5 nm to 30 nm.

Claim 10. (ORIGINAL) The method of claim 9 which further includes, prior to said implanting, depositing a layer of silicon oxide on the SiGe layer to a thickness of between about 50Å to 300Å.

Claim 11. (ORIGINAL) The method of claim 9 wherein said high temperature thermal annealing is done in an inert atmosphere taken from the group of inert atmospheres consisting of argon and nitrogen.

Claim 12. (ORIGINAL) The method of claim 9 which further includes, after said thermal annealing, depositing a layer of relaxed SiGe having a thickness of at least 100nm on the relaxed SiGe layer.

Claim 13. (ORIGINAL) The method of claim 9 wherein said depositing a layer of silicon-based material on the relaxed SiGe layer includes depositing a layer of material taken from the group of materials consisting of tensile-strained silicon, tensile strained SiGe, compressed SiGe, and a composite stack thereof.